

CLAIMS

What is claimed is:

- 1 1. A method, comprising:
2 lithographically patterning a corner over a material;
3 selectively removing portions of the material based on the lithographic pattern
4 to obtain a region that defines the corner; and
5 further removing portions of the material adjacent to the region to sharpen the
6 corner.
- 1 2. The method of claim 1 wherein selectively removing portions of the material
2 based on the lithographic pattern comprises using an anisotropic etching technique.
- 1 3. The method of claim 1 wherein lithographically patterning the corner includes
2 applying a photoresist material.
- 1 4. The method of claim 3, further comprising removing the photoresist material
2 from selected areas prior to sharpening the corner.
- 1 5. The method of claim 1 wherein further removing portions of the material
2 adjacent to the region comprises using an isotropic etching technique to sharpen the
3 corner.
- 1 6. The method of claim 1 wherein the material comprises a first material, the
2 method further comprising:

3 placing a second material in the region; and
4 removing excess second material from areas outside of the region.

1 7. The method of claim 6 wherein removing excess second material comprises
2 using a chemical-mechanical polishing technique.

1 8. The method of claim 6, further comprising placing a third material over the
2 second material.

1 9. The method of claim 8 wherein placing the third material over the second
2 material and placing the second material in the region comprises using a deposition
3 technique.

1 10. The method of claim 8 wherein the first and third materials comprise cladding
2 material, and wherein the second material comprises core material.

1 11. The method of claim 1 wherein the corner comprises part of a Y-branch of an
2 integrated optical device.

1 12. The method of claim 11 wherein the integrated optical device comprises a
2 waveguide.

1 13. The method of claim 1 wherein the corner comprises part of one of a
2 microelectromechanical structure (MEMS) device, a photonic crystal device, or a
3 photonic bandgap device.

14. The method of claim 1, further comprising monitoring the removal of the portions of the material adjacent to the region if sufficient time has elapsed to sharpen the corner.

15. The method of claim 14 wherein monitoring the removal of the portions of the material adjacent to the region comprises:

forming a diffraction grating having pillars of a substantially same radius as the corner to be sharpened;

illuminating the pillars with a light and detecting light diffracted from the pillars;

removing the pillars concurrently with removing portions of the material adjacent to the region; and

determining if sufficient time has elapsed to sharpen the corner based on the detected light diffracted from the pillars as they are removed.

16. The method of claim 3 wherein the corner is sharpened while the photoresist is in place.

17. A method, comprising:

lithographically patterning a corner over a cladding material deposited on a substrate;

based on the lithographic pattern, vertically etching the cladding material to selectively remove portions of the cladding material to define a rounded corner; and

isotropically etching the cladding material at the rounded corner to sharpen the rounded corner.

1 18. The method of claim 17, further comprising depositing a core material in a
2 trench, adjacent to the sharpened corner, which was formed by the vertical etching
3 and by the isotropic etching.

1 19. The method of claim 18, further comprising depositing another cladding
2 material over the core material, subsequent to a chemical-mechanical polish
3 process to remove excess core material deposited outside of the trench.

1 20. The method of claim 17, further comprising:
2 forming pillars concurrently with the vertical etching of the cladding material,
3 the pillars having a dimension comparable to that of the rounded corner; and
4 isotropically etching the pillars concurrently with the rounded corner to
5 determine completion of the sharpening based on light diffracted from the pillars.

1 21. The method of claim 17 wherein lithographically patterning the corner
2 includes using a photoresist.

1 22. A device, comprising:
2 a corner made of a first material and formed over a substrate; and
3 a region adjacent to the corner and made of a second material different from
4 the first material, wherein the corner is made by an etch process to sharpen the
5 corner.

1 23. The device of claim 22 wherein the first material comprises a cladding
2 material, wherein the second material comprises a core material, and wherein the
3 cladding and core materials comprise part of an optical waveguide.

1 24. The device of claim 22 wherein the corner and the region comprise part of a
2 microelectromechanical structure (MEMS).

1 25. The device of claim 22 wherein the second material comprises air.

1 26. The device of claim 22, further comprising a third material formed over the
2 corner and region.